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ABSTRACT

Because it presents a fresh perspective on spelling, linguistics can improve the spelling ability of high school students. Linguistic study involves students in learning how speech is conveyed in writing, how key linguistic generalizations can be applied to spelling, and how historical precedent and phonology affect the spelling of many common words. Several research reports, including those concerned with sound-letter correspondences, are available to teachers interested in studies of techniques for spelling instruction. One report--"Phoneme-Grapheme Correspondences as Cues to Spelling Improvement" by Paul R. Hanna and others--can also be used to arouse students' curiosity about spelling. Some learning activities that help students apply an elementary knowledge of linguistics include work with phonemes, dictionary-based activities, morphological analysis, and a mastery of 10 basic linguistic principles of spelling. (MP)

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*Proposes Linguistic Approach For Secondary Students*

MARY CLIFFORD

# Teaching Spelling in High School

By the time they reach high school, most students have a mind-set towards their own spelling capabilities. Some are competent spellers, know this, and resent any teaching attempt to conduct spelling lessons in the grade school manner. Some are poor spellers who feel they will never learn to spell anyway. They too passively resist spelling instruction. A fair number of students don't particularly care one way or another about spelling improvement but will comply with whatever the teacher directs. The number of students in each category varies according to the ability and aspirational level of the class. In most high school classes one finds several good spellers, several whose creativity for wrong spellings appears limitless, and a majority who need to brush up on a few generalizations either forgotten or never learned, to learn to write a certain number of words never previously encountered, or to master some personal demons. Most students who make an effort can learn to spell a given list of words for a test. Despite such success, they may misspell the same words in a composition a few days later; they may add improper inflectional and derivational affixes to the same word; and they may misspell words with similar sound patterns.

Correct spelling is generally not considered a high-level intellectual attainment, and in recent years it has been given relatively low priority in high school programs. Nonetheless, it remains an essential skill and one which the great majority of students can probably master if they wish to and if they are given enlightened instruction. What then has linguistics to offer in building spelling power? First and perhaps most

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important, it provides the real boon of considering old things from a fresh perspective. Students respond well to the consideration of how speech sounds are recorded in writing when such consideration is interrelated with their other language study, dictionary, and composition units. They enjoy mastering generalizations when this learning is done inductively and as short, cyclic activities which continue throughout the year. Secondly, new linguistic studies provide a scientific basis for spelling generalizations which can be developed or reinforced at the high school level. Linguistic evidence also points up words which, while in very common use, do not adhere to expected sound-letter correspondences and therefore must be mastered through other techniques. Once students become convinced that spelling need not be random guessing, that there are historical and phonological reasons for many spellings, they begin to attack the inconsistencies with more vigor and initiative. With improved attitudes comes improved performance!

But where does the teacher begin to look for research evidence or reports of studies of techniques for instruction and important generalizations? A most helpful source is *Research on Handwriting and Spelling*, a bulletin prepared by a committee of the National Conference on Research in English.[1] This bulletin has pulled together recent research studies, particularly those available which involve computerization and evaluated them in the light of studies done over the past half century. Limitations of and questions arising from the various studies are outlined. References are given for the studies made over the last fifty years as well as for the recent ones, so that the interested teacher can go to the original source for his own investigation. In addition, high school teachers will find the teaching manuals for the newer grade school spellers helpful, although they will need to develop more sophisticated activities for the high school level. They will also need to correlate these activities with the changing curriculum in the teaching of the English language. Not to be neglected by the teacher is a consideration of the total spelling behavior. This involves psychology of learning principles and strategies as well as consideration of the learner as one who has an information processing system with which he can sense and analyze the spelling problems and process information before making a decision. High school students respond well to some discussion of these intellectual-behavioral processes and often will be willing to exchange their poor strategies for better ones

[1]Thomas D. Horn, Editorial Chairman (Champaign, Illinois: National Council of Teachers of English, 1966).

when they themselves can see the reasons for the change. They are reassured to know that the suggestions given are at least in part based on scientific evidence and not just on one teacher's biased opinion.

Current linguistic knowledge indicates that English spelling is essentially alphabetic in structure. That is, there is a one-to-one correspondence between a letter and a significant sound or phoneme. However, the alphabetic nature of the writing system has not been taught explicitly in most schools. Rather, some students have intuitively or perhaps determinedly grasped and applied the alphabetic principle in their writing and thus are good spellers despite the spelling instruction (or lack of it) which they may have had. Until the advent of the computer, studies of sound-letter correspondences were necessarily limited and considerable controversy arose over the design, results, and conclusions drawn from the various studies. An example of these problems was that of the work of James Moore at Stanford University.[2] Moore undertook to analyze American-English in terms of Leonard Bloomfield's hypothesis that the American-English writing system was basically alphabetic in nature.[3] Moore tabulated the three thousand most frequently used words in children's oral and written vocabularies in terms of the frequency and percentage of sound-letter correspondences, using a phonemic classification which singled out vowels, single consonants, consonant blends, suffixes, and final blends. He concluded that an overall eighty percent "regularity" of phoneme-grapheme correspondence was attained in these three thousand words. This study was challenged by many authorities. For example, Ernest Horn analyzed ten thousand words, using a different research design intended to overcome the weaknesses in methodology he saw in the Moore study. In 1960, Horn noted:

1. More than one-third of the words in a standard reference work on the pronunciation of American English showed more than one accepted pronunciation.
2. Most sounds can be spelled in many ways, one spelling not being sufficient to call it the most "regular" spelling.
3. Over one-half of the words in a conventional dictionary of American English contain silent letters, and about one-sixth contain double letters when only one letter is actually sounded.

[2]James T. Moore, Jr., *Phonetic Elements Appearing in a Three Thousand Word Spelling Vocabulary*, Unpublished Doctoral Dissertation (Stanford, California: School of Education, Stanford University, 1951).

[3]Leonard Bloomfield, *Language* (New York: Henry Holt and Co., 1933).

4. Most letters spell many sounds, especially the vowels.
5. Unstressed syllables are especially difficult to spell.

Horn suggested that the limited number of words wholly consistent with this principle precluded the development of curriculums which primarily are based upon such linguistic evidence.[4] However, interested linguists such as Garvin,[5] Hall,[6] and Lloyd and Warfel[7] have since established rather clearly that the structure of written American English is essentially alphabetical. To date, the most extensive investigation of the degree to which the phonological structure consistently is represented throughout the lexicon is that initiated at Stanford University in January 1963, under the sponsorship of the Cooperative Research Branch of the Office of Education, U. S. Department of Health, Education, and Welfare as Project No. 1991. In 1966, the massive report on this study was published under the title, *Phoneme-Grapheme Correspondences as Cues to Spelling Improvement.*[8]

Teachers who are seriously interested in modifying their teaching strategies or in building curricula in their schools would be well advised to secure copies of *Phoneme-Grapheme Correspondences as Cues to Spelling Improvement* for their own detailed study and reference. Some advanced students would be fascinated by aspects of this report as they look at their language linguistically. Growing out of earlier works such as those cited above, this study used computer techniques to analyze 17,310 words from the lexicon of American English for their phoneme-grapheme relationships. Criterion for word selection was a hypothetical speaking and writing vocabulary of the "average educated American." Selection of words to meet this criterion was based largely on the *Thorndike-Lorge Teacher's Word Book of 30,000 Words*, Part I, which was prepared over 20 years ago. Excluded from the Thorndike-Lorge list were proper names, contracted

[4]Ernest Horn, "Spelling," *Encyclopedia of Educational Research*, ed. Chester W. Harris (New York: Macmillan, 1960), 1337-54.

[5]Paul L. Garvin, ed., *Natural Language and the Computer* (New York: McGraw-Hill Book Co., 1963).

[6]Robert A. Hall, Jr., *Sound and Spelling in English* (Philadelphia: Chilton Co., 1961).

[7]Donald J. Lloyd and Harry R. Warfel, *American English in Its Cultural Setting* (New York: Alfred A. Knopf, Inc., 1956).

[8]Paul R. Hanna, Jean S. Hanna, Richard E. Hodges, and Edwin R. Rudorf, Jr. (Washington, D. C.: U. S. Government Printing Office, 1966).

word forms, hyphenated words, abbreviations, archaic and poetical words, foreign words, trade names, slang and dialect words, words indicated as "now rare" in standard dictionaries, and words for which no pronunciation was provided in the dictionary that subsequently was chosen for the research. A total of 15,284 words from this list was supplemented by words from *Merriam-Webster's New Collegiate Dictionary*, 6th ed., which were considered to be part of a present day "common core" vocabulary not listed in the older Thorndike-Lorge list.

Since the research was based upon linguistic principles, the directors believed the phonemic code which best reflected linguistic knowledge and provided a kind of general American English "dialect" most suited for phonological analysis was the pronunciation key of *Merriam-Webster's New Collegiate Dictionary*, 6th ed. Each phoneme-grapheme correspondence was then classified according to three kinds of frequency and percentage tabulation: frequency and percentage tabulation of phoneme-grapheme correspondences, irrespective of phonological factors, as they occur throughout the corpus; frequency and percentage tabulation of phoneme-grapheme correspondences as they occur in initial, medial, and final position in syllables; frequency and percentage tabulation of phoneme-grapheme correspondences in each of these positions in syllables, but including the amount of stress given to the syllables in which they occur. For example, the phoneme represented by the grapheme *oo* in *food* could also be represented by fifteen other graphemes–*u*, *o*, *u-e*, *ou*, *uo*, *ue*, *oo-e*, *o-e*, *ui*, *eu*, *oe*, *ui-e*, *ou-e*, *ough*, and *ew*. Through tabulation of 17,310 words, the researchers arrived at the percentage of frequency for each of the graphemic representations of the phoneme. Further analysis tabulated these frequencies according to position in syllables. A third level of analysis tabulated these frequencies according to amount of stress given to the syllables in which they occurred.

The following are some of the most significant findings:

1. More than one-half of the consonant phonemes have particular spellings which occur eighty percent or more of the time in the lexicon, irrespective of position or stress in words.
2. Many vowel phonemes have particular graphemic representation eighty percent or more of the time although vowels collectively are less consistent than are consonant phonemes.
3. When the twenty-two vowel phonemes in a fifty-two phoneme classification are analyzed without regard for positional effect, their mean percentage of correspondence to the alphabetic principle is 62.27%. When position is considered, the percentage increases to 74.65%.
4. A large majority of spelling problems are caused by eight

> phonemes: /â/ as in care, /ē/ as in here, /o͞o/ as in food, /o͝o/ as in foot, /û/ as in urn, /ə/ as in circus, syllabic /'n/ as in button, and /z/ as in zebra. When these eight phonemes are considered separately, the percentage of predictability of the other phonemes is over ninety-one percent.

The researchers concluded: "The orthography of American English is determined by a set of rules for unit phoneme-grapheme relationships based, with decreasing productivity, upon three levels of analysis: phonological, morphological, and syntactical."[9] They then provided the following outline summary to develop their point: "Phoneme-grapheme relations are determined by:

1. Phonological factors
   a. Position
   b. Stress
   c. Environmental factors
2. Morphological factors
   a. Compounding
   b. Affixation
   c. Word families
3. Syntax"[10]

The teacher's problem, of course, is to relate what the studies indicate about phoneme-grapheme correspondences to what attitudes, understandings, and habits his students need to develop to increase their spelling competencies. A bit of drama may be in order to arouse curiosity and to interest students in what the computers have turned up about what they may have previously considered just a hodgepodge —American-English spelling. One might open the discussion by presenting the graphemes *ghoti* for the spelling of the phonemes /fish/. The class will enjoy figuring out that the person who first concocted this spelling was probably thinking of /f/ as in *tough*, /i/ as in *women*, and /sh/ as in *attention*. For homework, the class might be challenged to think of as many words as they can having *gh* for /f/, *o* for /i/, and *ti* for /sh/. The following day, lists with these words can be compiled on the board. Discussion as to where in the words these spellings occurred can then be pursued. Following class conclusions of their own, the teacher can present the tabulation of the 1966 *Phoneme-Grapheme Cor-*

[9]Ibid., 108.

[10]Ibid., 108.

*respondences as Cues to Spelling Improvement* on these correspondences. A check will indicate that *gh* for /f/ in an initial syllable occurred with .00 percent frequency; *o* for /i/ in medial position in a syllable occurred with .03 percent frequency; *ti* for /sh/ occurred in unaccented final position with .00 percent frequency although it occurred in accented final syllable with 29.67 percent frequency and in final syllable with secondary accent with 8.70 percent frequency. Most high school students (but especially boys, who are sometimes quite uninterested in spelling routine) are particularly intrigued with how the computer was programmed and how it analyzed words to come up with these statistics. This interest can lead to much profitable work with phonemes and their written representation or graphemes, which students may or may not have mastered in grade school days. Students can be challenged to think of all possible ways to record certain sounds and then to draw generalizations as to when or where in a word certain sounds might be represented in a particular way. Dictionary phonetic keys will be mastered painlessly as this kind of work is underway. Many high school students are quite unsure of stress values and meanings of accent marks. Short dictionary-based activities involving deliberate wrong stressing of syllables can be both entertaining and profitable. The especially curious or studious might compare class conclusions about particular sounds and their representations with those reported in *Phoneme-Grapheme Correspondences as Cues to Spelling Improvement.* If the point is not sufficiently established that there usually is a sound-letter correspondence, the teacher can dictate some nonsense words for spelling, for example, *glab, rog, sarl, runsib, drep.* Most students will spell these nonsense words correctly. Discussion can point out that students chose the most likely grapheme to represent the sound they heard and not the least likely as the *ghoti* example did.

The teacher can establish some linguistically sound general principles for increasing spelling power by writing *supercalifragilisticexpialidocious* on the board and telling the class they have thirty seconds to learn to spell it. After thirty seconds have expired, several students will have learned the word. The others might profit from hearing that their colleagues got the word because:

1. They pronounced the word carefully to themselves, hearing all the sounds in it.
2. They looked at the word carefully, noticing the letters that spelled sounds that could be tricky.
3. They thought about roots, prefixes, and suffixes they already knew which were in the word.
4. They reviewed the difficult parts of the word either in writ-

ing or in their minds.
5. Some of them may have used a mnemonic trick or remembered the tune to which the word was sung.

A rather sophisticated discussion might ensue.

Consider the student who confuses *does* and *dose*. Will pronouncing the word help? When did he first misspell the word? Will a long established habit be corrected overnight? One can compare spelling to sports where a basic technique has been learned and improperly used for years. One can also consider a number of ways a student with such a problem might begin to correct it: writing the word in the air; color coding the difficult part of the word; writing the difficult part in bigger letters; never writing the word wrong–instead inserting a question mark over the confused part; using sound-letter cues if these will help on a particular word, and using visual cues if these will help. At all times, questions and activities should be guided in such a way that students can arrive at their own diagnosis, and be aware of the nature of their particular spelling problem. Correction of errors and increased spelling power can initially come only through students' conscious realization of the possibilities and the reasons for a particular graphemic choice.

Since some of the very common structure words of the language–*about, across, against, almost, another, because, during, of, off, quite, still, then, than, to, through, till, where, were, when, with*–are among those frequently misspelled by students, the teacher can use statistical analysis to make the students aware of how frequently the words are used. In using a linguistic approach to the grammar of the language, the teacher can see that students develop an understanding of how basic these words are to our communication system. It is through this kind of understanding that high school students can be motivated to undertake the hard, personal work of correcting long established bad spelling habits, which often both teacher and student mistake for carelessness. Some techniques for proofreading, while not necessarily pertinent to this discussion, should also be explored with students. Particularly helpful are Falk Johnson's suggestions.[11]

In addition to a consideration of the importance of certain words in the English syntax and to the review of sound-letter correspondences as related to position, stress, and environment, students will find work with the morphological or meaning-bearing factors helpful. Meanings

[11]Falk S. Johnson, *A Self-Improvement Guide to Spelling* (Chicago, Illinois: Holt, Rinehart and Winston, 1965), pp. 23-28.

can be explored as attention is focused on doubled letters at the beginning or end of words as prefixes or suffixes are added to stems—*over+rated*, *inter+racial*, *rotten+ness*, *normal+ly*. Periodic play with word families can direct attention to the interrelationships—*personal*, *personally*, *personalize*—and students can see that certain forms of words fit certain slots in the syntax or perform the function of certain parts of speech. Generalizations for spelling can be reviewed as students consider inflected forms: *write*, *writing*, *written; cry*, *cried*, *crying; church*, *churches; refer*, *referred*, *referring; satisfy*, *satisfied*, *satisfying.* If the curriculum includes work in the nature of language and the history of the English language, students will enjoy learning why certain spellings occur as they do. Why is *oxen* the plural of *ox* and *knives* the plural of *knife*?

The following ten principles of spelling power will be familiar to most teachers:

1. Count nouns that end with the phonemes /x/, /s/, /z/, /sh/, and /ch/ and form plurals by adding the graphemes *es*.
2. Terminal doubling of a letter occurs: a) if the suffix begins with a vowel; b) if the last syllable of the root contains only one vowel; c) if the last syllable ends with only one consonant; and, d) if the last syllable is the most heavily stressed syllable in the word.
3. So-called silent *e* is a pronunciation sign. Final silent *e* usually drops before a suffix beginning with a vowel and is retained before a suffix beginning with a consonant.
4. If the grapheme *y* at the end of a word is preceded by a consonant grapheme, it is ordinarily changed to *i* before any suffix except one beginning with *i*. If the *y* is preceded by a vowel grapheme, the *y* is normally retained.
5. The following old jingle works fairly well as a clue in spite of a number of exceptions such as *neither*, *either*, and *height*:

   *I* before *e* except after *c*,
   Or when sounded like *a*,
   As in n*ei*ghbor and w*ei*gh.

   Students may want to master the jingle to help them remember *believe*, *receive*, etc. and then just memorize common exceptions.
6. Homonyms are identical in pronunciation. Spellings and meanings differ. Work on the ones that cause trouble separately. Use meaning associations or other forms of the word to help in the spelling. Historical origins of these words are interesting.
7. Some prefixes have variant forms. For example, *in* becomes *im*, *ir*, or *il* before certain roots. Reasons for this can be ex-

plored through the history of sounds in English and experimenting with pronouncing the words without the changes. Units of work which develop meanings and variant forms of prefixes such as *ad, com, de, dis, ex, in, im, inter, mis, ob, per, pre, pro, re, sub, syn, un* added to numerous words will be most helpful.

8. Sound-spelling relationship is often blurred in unstressed syllables. However, the relationship often becomes evident in at least one form of the word, which furnishes a clue to the spelling of another form. For example, vit*a*l—vit*a*lity, nation*a*l—nation*a*lity, ang*e*l—ang*e*lic.
9. Words having silent letters can be very troublesome. (Class groups or individuals will profit from finding and listing groups of so-called silent letters and perhaps finding out why these letters do not represent individual sounds today.)
10. Contractions should be understood clearly. What words are being combined and shortened by the use of the apostrophe?

Just as it is reassuring to know that recent studies have supported the essential validity of these old principles, so is it refreshing for the teacher to set up inductive activities which will help today's student master them.

Obviously an inductive, linguistic approach is not magic nor is it entirely new. It is equally obvious that skillful use of its focus can bring about magical effects in the high school classroom. In summary then, the basic formula for increasing spelling power at the high school level is good student attitude + intelligent teaching strategy. Linguistics can provide the key to both.